HARTZELL PROPELLER INC.

SERVICE LETTER

TRANSMITTAL SHEET

HC-SL-61-360

Blade - Damage Evaluation for NC10245( ) Blades Installed on (but not limited to) Pilatus PC-12 Aircraft

August 01, 2018

This page transmits a revision to Service Letter HC-SL-61-360.

- Original Issue, dated Feb 01/17
- Revision 1, dated Aug 01/18

Changes are shown by a change bar in the left margin of the revised pages.

Revision 1 is issued to change the following in this Service Letter:

- Revised the section, "Description"
- Revised the section, "Damage Evaluation"
- Added the section, "Conditional Operation/Flight Request"
- Revised Figure 1, "Interpretation of Erosion Shield Damage"
- Added the section, "Damage Identification" and all of the applicable Figures
- Added the section, "Coin-Tap Inspection" and Figure 16, "Coin Tap Inspection"
- Added the "AMI Request Form"

This Service Letter is reissued in its entirety.

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Blade - Damage Evaluation for NC10245( ) Blades Installed on (but not limited to) Pilatus PC-12 Aircraft

1. Planning Information

A. Effectivity

(1) Hartzell Propeller Inc. aluminum hub lightweight turbine propellers HC-E5A-3A with NC10245( ) composite blades are affected by this Service Letter.

(a) The affected propellers may be installed on, but not limited to, Pilatus PC-12 aircraft.

WARNING: DO NOT USE OBSOLETE OR OUTDATED INFORMATION. PERFORM ALL INSPECTIONS OR WORK IN ACCORDANCE WITH THE MOST RECENT REVISION OF THIS SERVICE LETTER. INFORMATION CONTAINED IN THIS SERVICE LETTER MAY BE SIGNIFICANTLY CHANGED FROM EARLIER REVISIONS. FAILURE TO COMPLY WITH THIS SERVICE LETTER OR THE USE OF OBSOLETE INFORMATION MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE. REFER TO THE SERVICE LETTER INDEX FOR THE MOST RECENT REVISION LEVEL OF THIS SERVICE LETTER.

B. Reason

(1) This Service Letter enables the operator or pilot to make an assessment of propeller blade damage and its suitability for continued flight.

(2) This Service Letter provides a Damage Evaluation Reference Table that provides airworthiness limits for the most common damage types occuring on NC10245( ) blades. The information in this reference table is taken from the complete list of damage types/airworthy limits in the Hartzell Propeller Inc. composite blade maintenance manuals listed below:

(a) Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70)

(b) Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual 135F (61-13-35)

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C. Description

(1) This Service Letter provides Additional Maintenance Information (AMI).

(2) This Service Letter provides a Damage Evaluation Reference Table for NC10245( ) blades only.

(a) The Damage Evaluation Reference Table in this Service Letter includes the applicable airworthy limits for blade damage types that can be identified and evaluated without advanced inspection techniques and/or de-ice boot removal.

NOTE: Blade damage types that require advanced inspection techniques and/or de-ice boot removal to evaluate are not included in the Damage Evaluation Reference Table in this Service Letter.

(b) For a complete list of all damage types and their airworthy limits, refer to one of the Hartzell Propeller Inc. composite blade maintenance manuals listed below:

1 Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70)

2 Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual 135F (61-13-35)

(3) Revision 1 of this Service Letter added the section, "Damage Identification" to define and illustrate specific damage types that are referenced in this Service Letter.

(4) Revision 1 of this Service Letter added instructions for performing the coin tap procedure to evaluate damage.

(5) Revision 1 of this Service Letter added an AMI Request Form to report blade damage to Hartzell Propeller Inc.

D. Approval

(1) This technical document is approved by Hartzell Propeller Inc.

E. References

(1) Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70)

(2) Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual 135F (61-13-35)

2. Accomplishment Instructions

CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS SERVICE LETTER INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE APPLICABLE PROPELLER OVERHAUL OR OWNER'S MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS.

A. Damage Evaluation

(1) Refer to Table 1, "Damage Evaluation Reference Table: NC10245( ) Blades" in this Service Letter to evaluate damage on NC10245( ) blades without advanced inspection techniques and/or de-ice boot removal.

(a) Refer to the section, "Damage Identification" in this Service Letter for descriptions of specific damage types.

(b) The identifying Damage Type numbers used in the reference table match the Damage Type numbers used in the composite blade maintenance manuals listed in the References section of this Service Letter.

B. Conditional Operation/Flight Request

(1) If there is blade damage that is greater than the permitted Airworthy Damage Limits but operation/flight is required before the applicable repairs can be performed, submit a request for conditional operation using the AMI Request Form in this Service Letter.

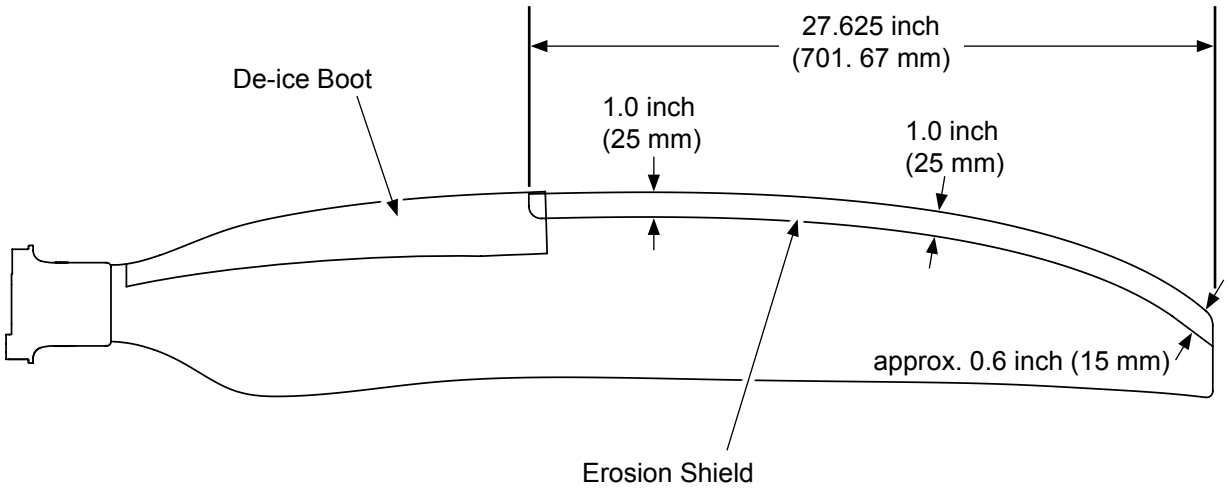
(a) Complete all of the fields on the AMI Request Form including the diagram of blade damage, then send the completed form to the Hartzell Propeller Inc. Product Support Department for evaluation.

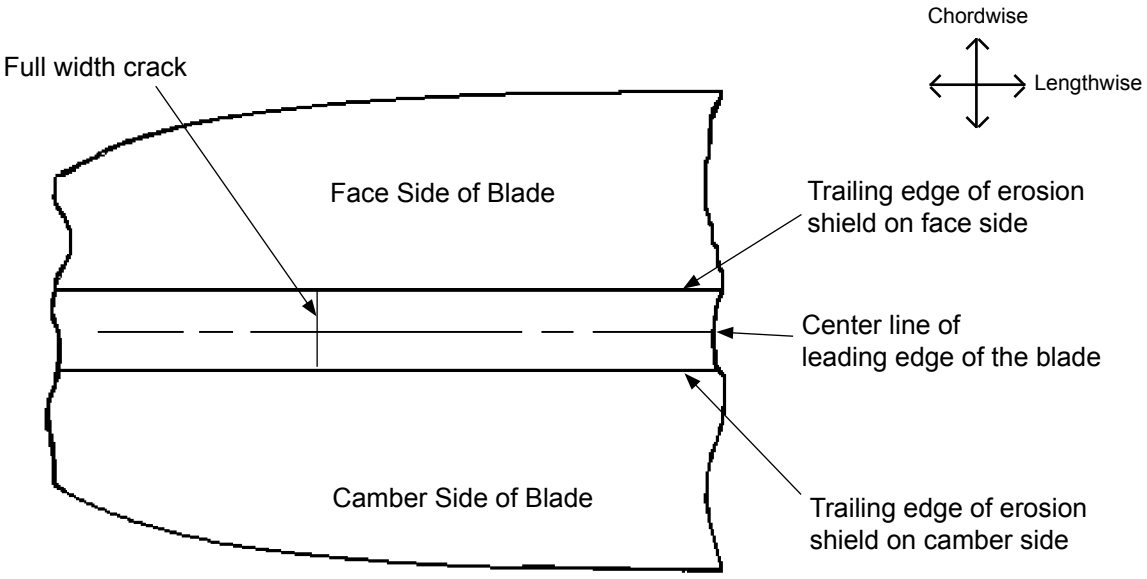
1 Digital pictures are not required, but can be helpful to evaluate the blade damage.

(2) If immediate attention is required outside of normal Hartzell business hours (8am-5pm EST, Monday-Friday), contact the Hartzell Product Support Department using the 24-hour AOG line at 937-778-4376.

C. Contact Information

Hartzell Propeller Inc.
Attn.: Hartzell Propeller Inc. Product Support
One Propeller Place
Piqua, Ohio 45356-2634 USA
Phone: (001) 937.778.4379
Fax: (001) 937.778.4215
E-mail: techsupport@hartzellprop.com

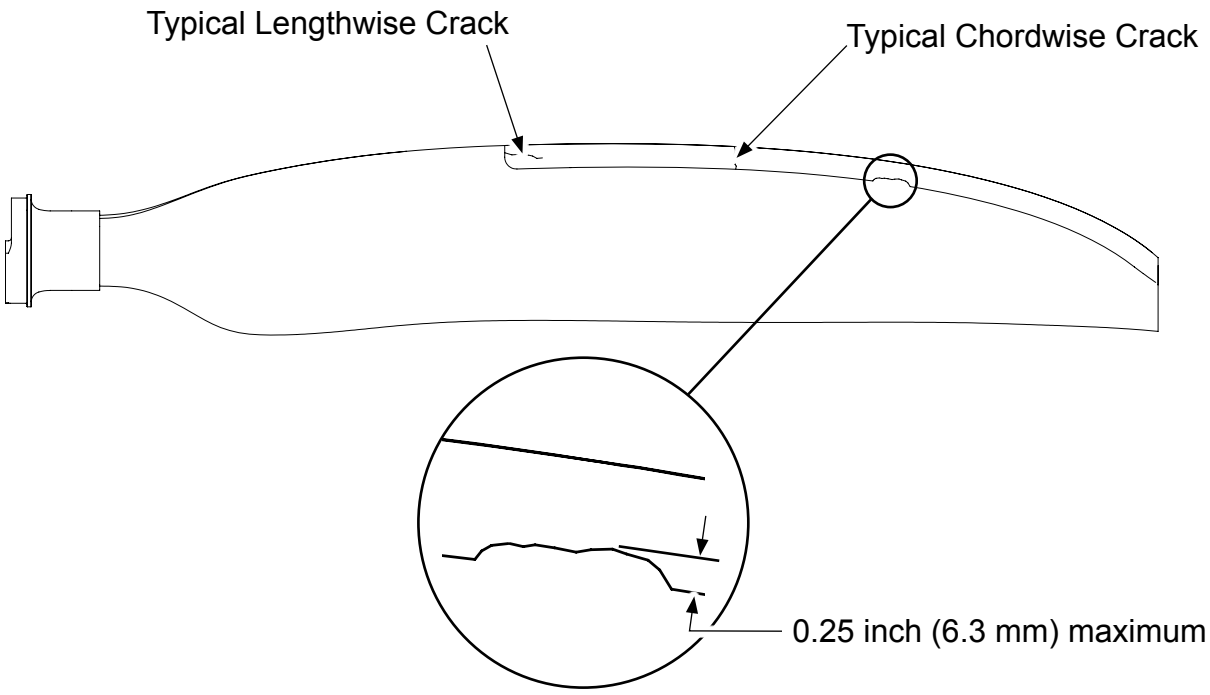




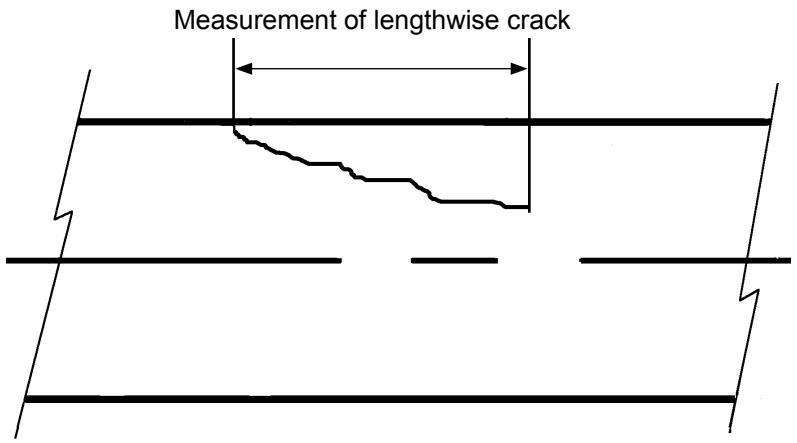
When calculating the area of damage and the proximity to other damage, look at the erosion shield as a two dimensional shape, as if it were unfolded and spread flat where the face and camber sides of the blade could be viewed at the same time.

APS6041

Interpretation of Erosion Shield Damage
Figure 1



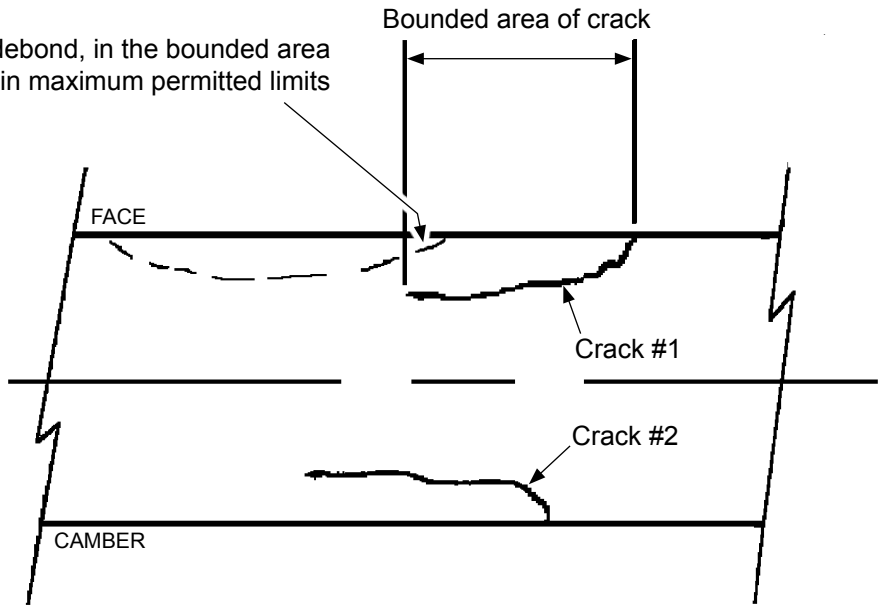
Missing Portions of Nickel Erosion Shield (Trail Side) and Typical Cracks
Figure 2



"Lengthwise crack" refers only to the length of the crack. To determine the length, measure parallel to the pitch axis of the blade from the most inboard location to the most outboard location.

W10001

Measuring Lengthwise Crack
Figure 3

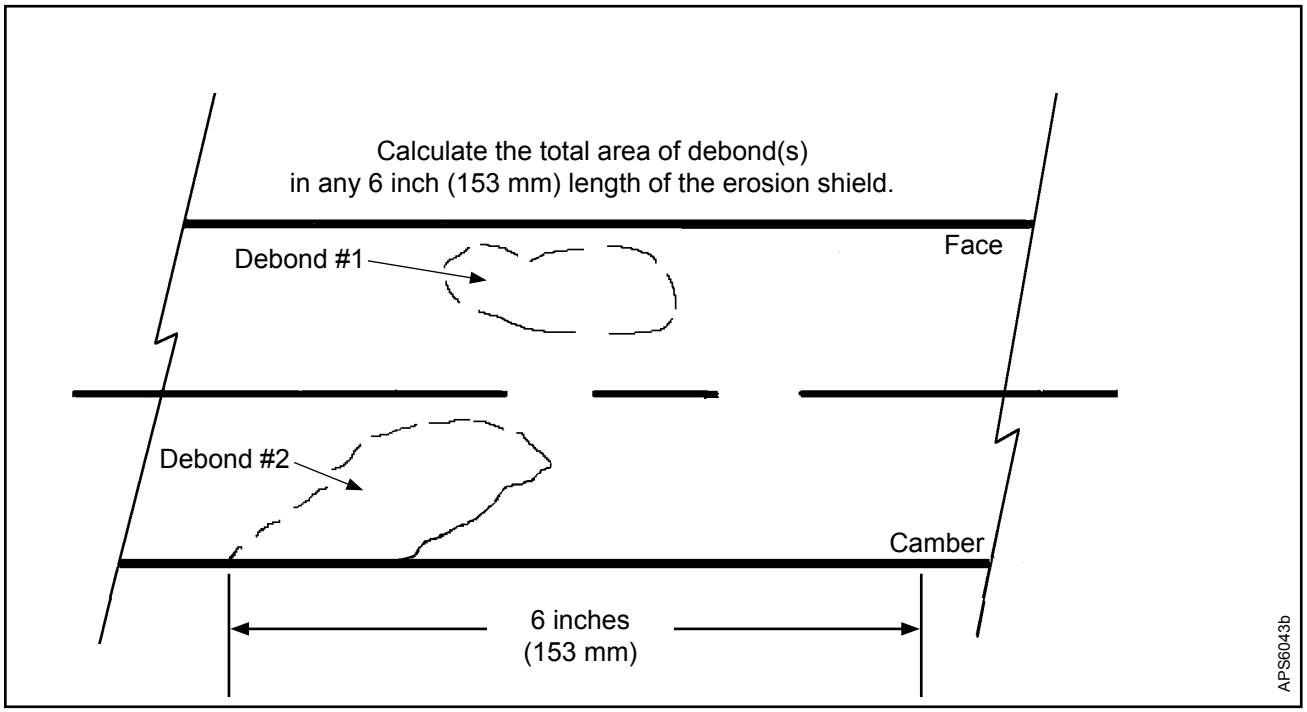


Crack #1 and Crack #2 are within the same linear length (not airworthy).
Note that the cracks are on opposite sides of the blade.

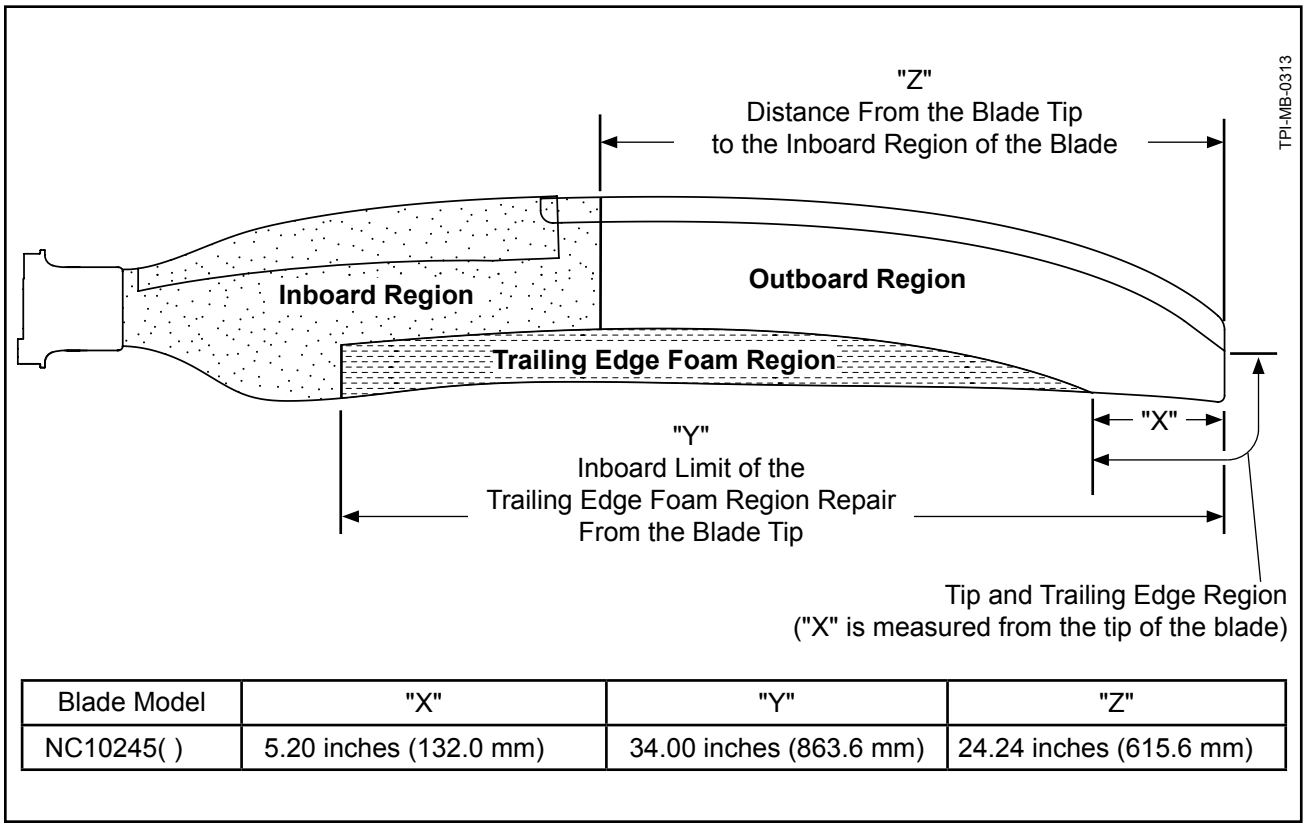
NOTE: The bounded area of a crack extends to both edges of the erosion shield.

APS6042

Acceptable Erosion Shield Debond, Non-acceptable Crack Location
Figure 4



Erosion Shield Debonds
Figure 5



Blade Model	"X"	"Y"	"Z"
NC10245( )	5.20 inches (132.0 mm)	34.00 inches (863.6 mm)	24.24 inches (615.6 mm)

Repair Regions - NC10245( ) Blades
Figure 6

DAMAGE TYPE	AIRWORTHY DAMAGE LIMITS
1. Nickel Erosion Shield - Minor Deformation - For the Entire Erosion Shield	Erosion shield deformations caused by impact damage or erosion that does not penetrate through the shield is permitted. Erosion shield deformations caused by impact or erosion that have penetrated the erosion shield are airworthy if any related crack, gouge, and debond does not exceed the airworthy limits specified for each condition in this table.
2. Nickel Erosion Shield - Gouge - For the Entire Erosion Shield	Exposed foam is not permitted. The maximum permitted total accumulated area of gouges through the erosion shield is 0.25 sq. inch (161.2 sq. mm). The maximum permitted depth of damage to the blade surface below the erosion shield is 0.020 inch (0.50 mm). NOTE: This is two layers of composite material. Damage cannot be permanently repaired without replacement of the erosion shield, but within these limits, does not make the blade unairworthy.
3. Nickel Erosion Shield - Area Missing Along the Trailing Edge of the Erosion Shield - For the Entire Erosion Shield	Pieces of material from the trailing edge of the erosion shield may be missing because of erosion or sanding performed during the erosion shield installation procedure. The missing area must be no farther than 0.25 inch (6.3 mm) from the trailing edge of the erosion shield. Refer to Figure 2 for an example of permitted missing material. Damage cannot be permanently repaired without replacement of the erosion shield, but within these limits, does not make the blade unairworthy. (Refer to Figure 1 and Figure 2)
4. Nickel Erosion Shield - Debond - For All Areas that are NOT Covered by an External De-ice or Anti-icing Boot	A maximum of 20% of the erosion shield may be debonded in any 6 inch (153 mm) length of the erosion shield. (Refer to Figure 1 and Figure 5)
5. Nickel Erosion Shield - Chordwise Crack - For All Areas that are NOT Covered by an External De-ice or Anti-icing Boot	Two full width, chordwise cracks may not be within 6.0 inches (153 mm) of each other. A full width, chordwise crack may not be within 6.0 inches (153 mm) of the blade tip. A full width, chordwise crack may not be within 1.0 inch (25 mm) of the outboard end of the de-ice or anti-icing boot. A full width chordwise crack may not be within 6.0 inches (153 mm) of the inboard end of the erosion shield. For a full width, chordwise crack that is in an area from 1.0 inch (25 mm) to 6.0 inches (153 mm) outboard of the end of the de-ice or anti-icing boot, the maximum permitted area of debond is 20% and the area of debond must not extend under the de-ice or anti-icing boot. (Refer to Figure 1 and Figure 2)
6. Nickel Erosion Shield - Lengthwise Cracks - For All Areas that are NOT Covered by an External De-ice or Anti-icing boot	The maximum permitted length of a crack is 2.0 inches (50 mm). Two lengthwise cracks may not be within the same linear length on the erosion shield. This includes cracks on opposite sides of the blade. Refer to Figure 4 for an example of a violation of this limit. (Refer to Figure 1, Figure 3, and Figure 4)
21. Gouge or Loss of Composite Material - Outboard Region of the Blade	The maximum permitted diameter or equivalent area (0.20 sq. inch or 129 sq. mm) of a gouge or loss of material is 0.500 inch (12.70 mm). The maximum permitted length of a gouge or loss of material is 2.5 inches (63 mm). The maximum permitted depth of a gouge or loss of material is 0.020 inch (0.50 mm). (Refer to Figure 6)
22. Gouge or Loss of Composite Material - Trailing Edge Foam and Leading Edge Foam Regions of the Blade	The maximum permitted diameter or equivalent area of a gouge or loss of composite material is 0.500 inch (12.70 mm).The maximum permitted length is 2.5 inch (63 mm). The maximum permitted depth is 0.020 inch (0.50 mm). Exposed foam or a delamination is not permitted. (Refer to Figure 6)
23. Gouge or Loss of Composite Material - Inboard Region of the Blade	A gouge or loss of composite material on the inboard region of the blade is unairworthy. (Refer to Figure 6)
24. Delamination - Outboard Region of the Blade	The maximum permitted area of delamination is 2.0 sq. inches (1290 sq. mm). (Refer to Figure 6)
26. Delamination - Trailing Edge Foam and Leading Edge Foam Regions of the Blade	The maximum permitted area of delamination is 2.0 sq. inch (1290 sq.mm). (Refer to Figure 6)
27. Delamination - Inboard Region of the Blade	A delamination on the inboard region of the blade is unairworthy. (Refer to Figure 6)

Damage Evaluation Reference Table: NC10245( ) Blades
Table 1, page 1 of 2

DAMAGE TYPE	AIRWORTHY DAMAGE LIMITS
28. Split Trailing Edge - Tip and Trailing Edge Region of the Blade	The maximum permitted depth of a split area is 0.5 inch (12 mm). The maximum permitted length is 6.0 inches (152 mm). Damaged fibers or exposed foam are not permitted. (Refer to Figure 6)
29. Split Trailing Edge - Inboard Region	A split trailing edge on the inboard region of the blade is unairworthy. (Refer to Figure 6)
30. Crushed or Cracked Trailing Edge - Inboard Region of the Blade	A crushed or cracked trailing edge on the inboard region of the blade is unairworthy. (Refer to Figure 6)
31. Crushed or Cracked Trailing Edge - Outboard and Tip Regions of the Blade	The maximum permitted depth of a crushed or cracked area is 0.25 inch (6.3 mm). The maximum permitted length of a crushed or cracked area is 2.0 inches (50 mm). (Refer to Figure 6)
32. Crushed or Cracked Trailing Edge - Trailing Edge Foam Region	The maximum permitted depth of a crushed or cracked area is 0.25 inch (6.3 mm). The maximum permitted length of a crushed or cracked area is 2.0 inches (50 mm). (Refer to Figure 6)
33. Paint Erosion - for the Entire Blade	For the areas of the blade where there is composite material, the maximum permitted exposure of the composite material and/or of the primer filler is 5.0 sq. inches (3225 sq. mm). NOTE: This limit does not refer to the primer sealer (gray layer). For the areas of the blade where there is an erosion shield, paint may be missing from the entire area of the erosion shield and the blade is airworthy. For maintenance scheduling purposes, propellers with blades that show more than 5.0 sq. inches (3225 sq. mm) of paint erosion, may continue operation for an additional 250 hours or 1 (one) month, whichever occurs first.
34. Loss of Paint and/or Filler Material - For the Erosion Shield ONLY	Paint and/or filler material may be missing from the entire area of the erosion shield and the blade is airworthy.
37. De-ice or Anti-icing Boot - Damage, Wear, Debond	The maximum permitted area of a debond is 3.00 sq. inches (1935.48 sq. mm) over the entire surface of the boot, face-side and camber-side combined. A raised area of a debond must not have signs of accelerated erosion, tearing, punctures, or other unusual wear or damage that could lead to premature failure of the boot. A boot that has significantly raised areas of debond that would obviously affect the function must be replaced before further flight.

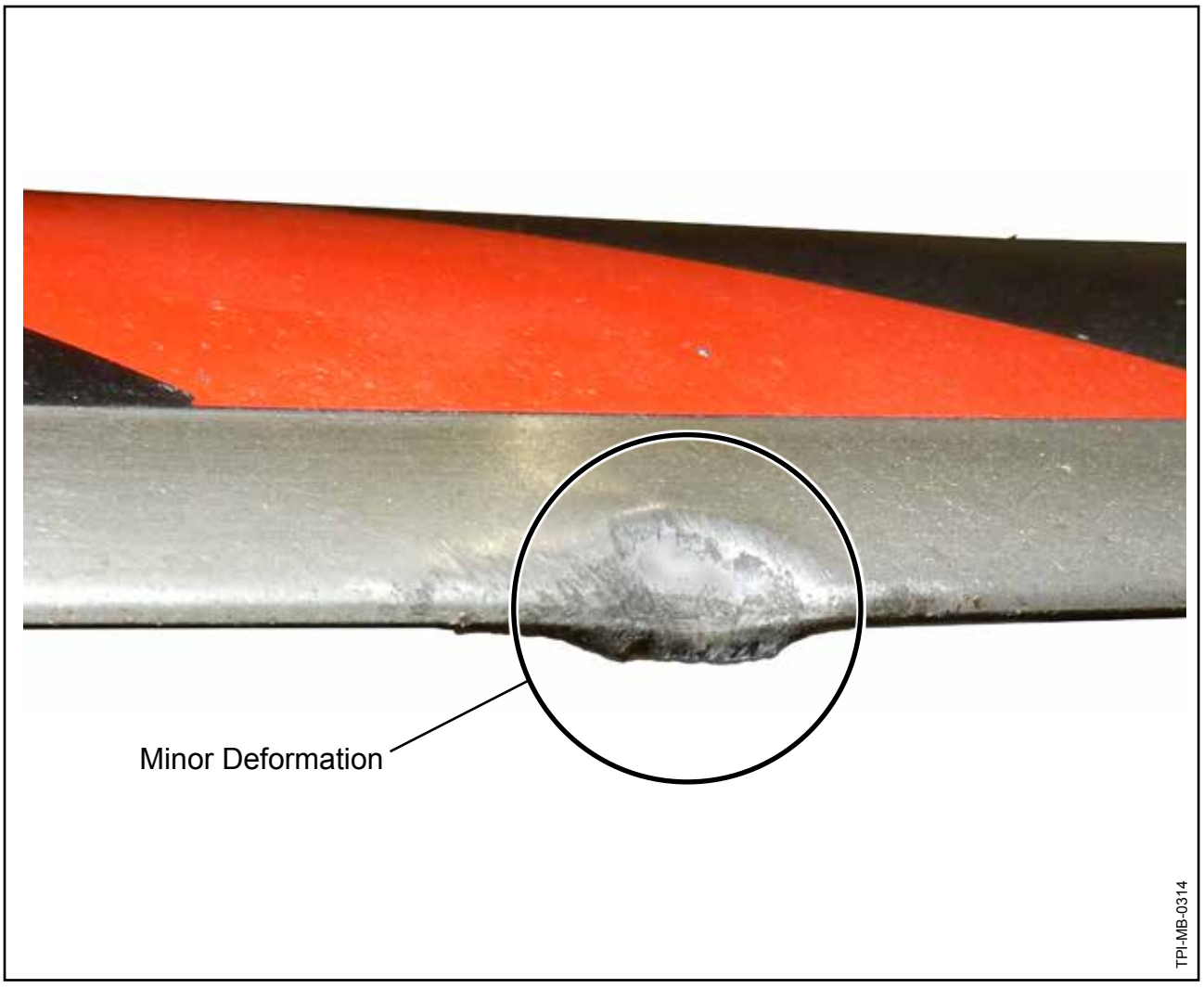
Damage Evaluation Reference Table: NC10245( ) Blades
Table 1, page 2 of 2

3. Damage Identification

A. Damage Type Definitions

(1) Minor Deformation of the Erosion Shield - (Table 1: Damage Type 1)

(a) A dent on the erosion shield that does not include any exposed composite material or missing areas of the erosion shield.



Minor Deformation
Figure 7

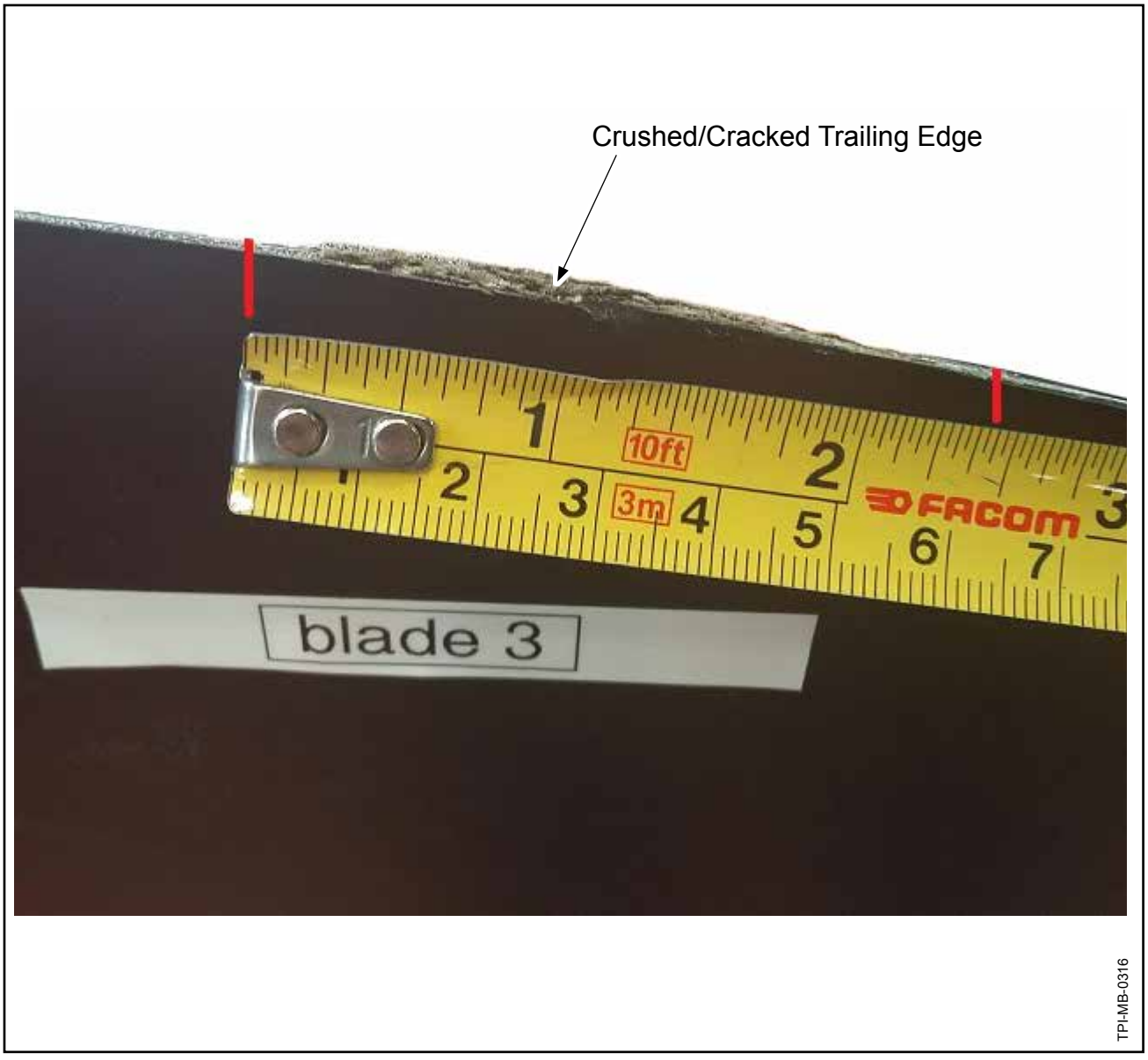
(2) Split Trailing Edge - (Table 1: Damage Types 28 and 29)

(a) Delamination of a composite blade extending to the blade surface, normally found near the trailing edge or tip of the blade. Refer to the example shown in Figure 8.

Split Trailing Edge
Figure 8

(3) Crushed/Cracked Trailing Edge - (Table 1: Damage Types 30, 31, and 32)

(a) A trailing edge that has been crushed/cracked due to impact.



Crushed/Cracked Trailing Edge
Figure 9

(4) Loss of Paint/Filler Material on the Erosion Shield - (Table 1: Damage Type 34)

(a) Missing paint/filler material that exposes the metal erosion shield.

Loss of Paint/Filler Material on the Erosion Shield
Figure 10

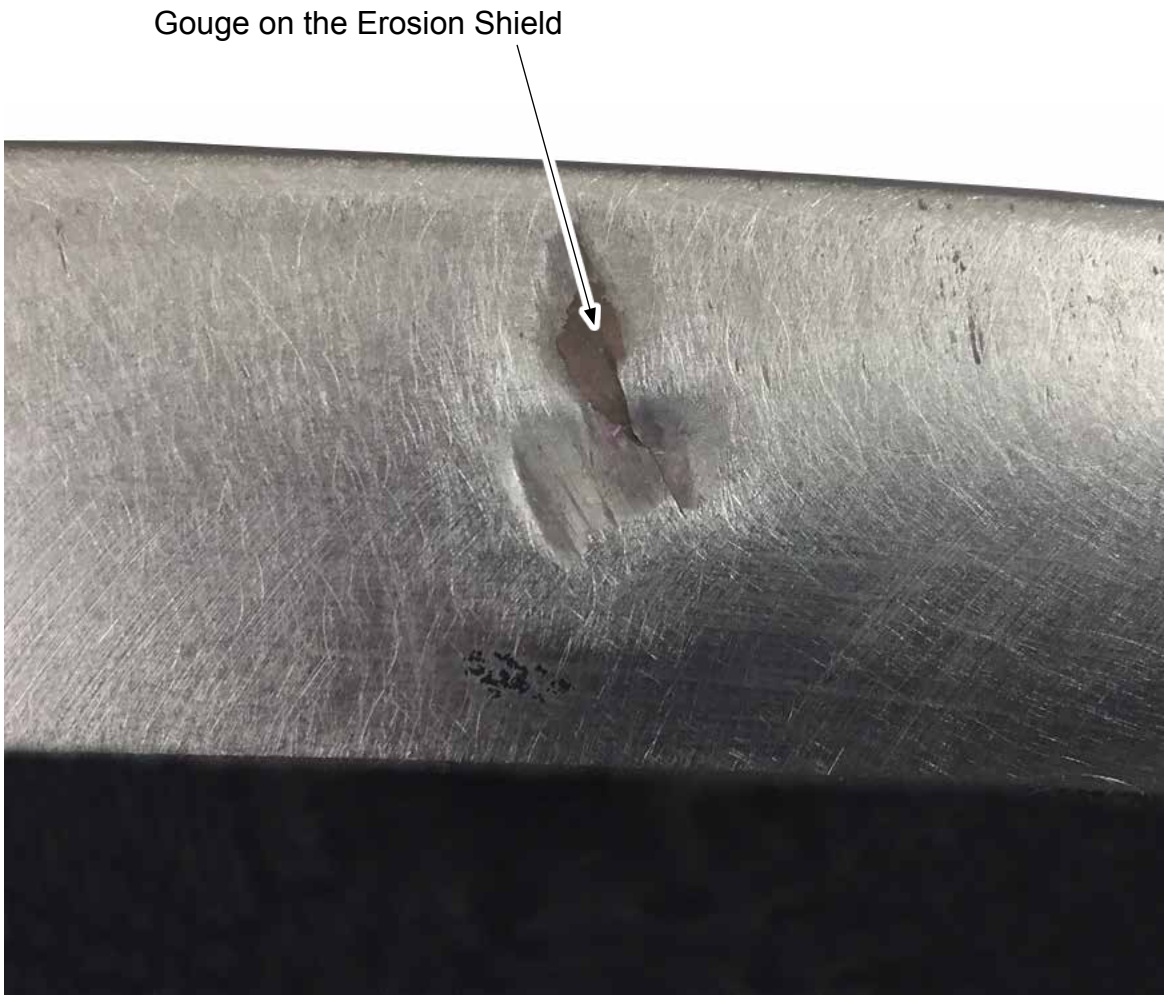
(5) Paint Erosion - (Table 1: Damage Type 33)

(a) Gradual wearing away or deterioration of the paint caused by action of the elements. Refer to the example shown in Figure 11.

Paint Erosion
Figure 11

(6) Gouge on the Erosion Shield - (Table 1: Damage Type 2)

(a) Impact damage on the erosion shield where metal has been removed. Refer to the example shown in Figure 12.



NOTE: The paint on the erosion shield has been removed for clarity.

TPI-MB-0319

Gouge on the Erosion Shield
Figure 12

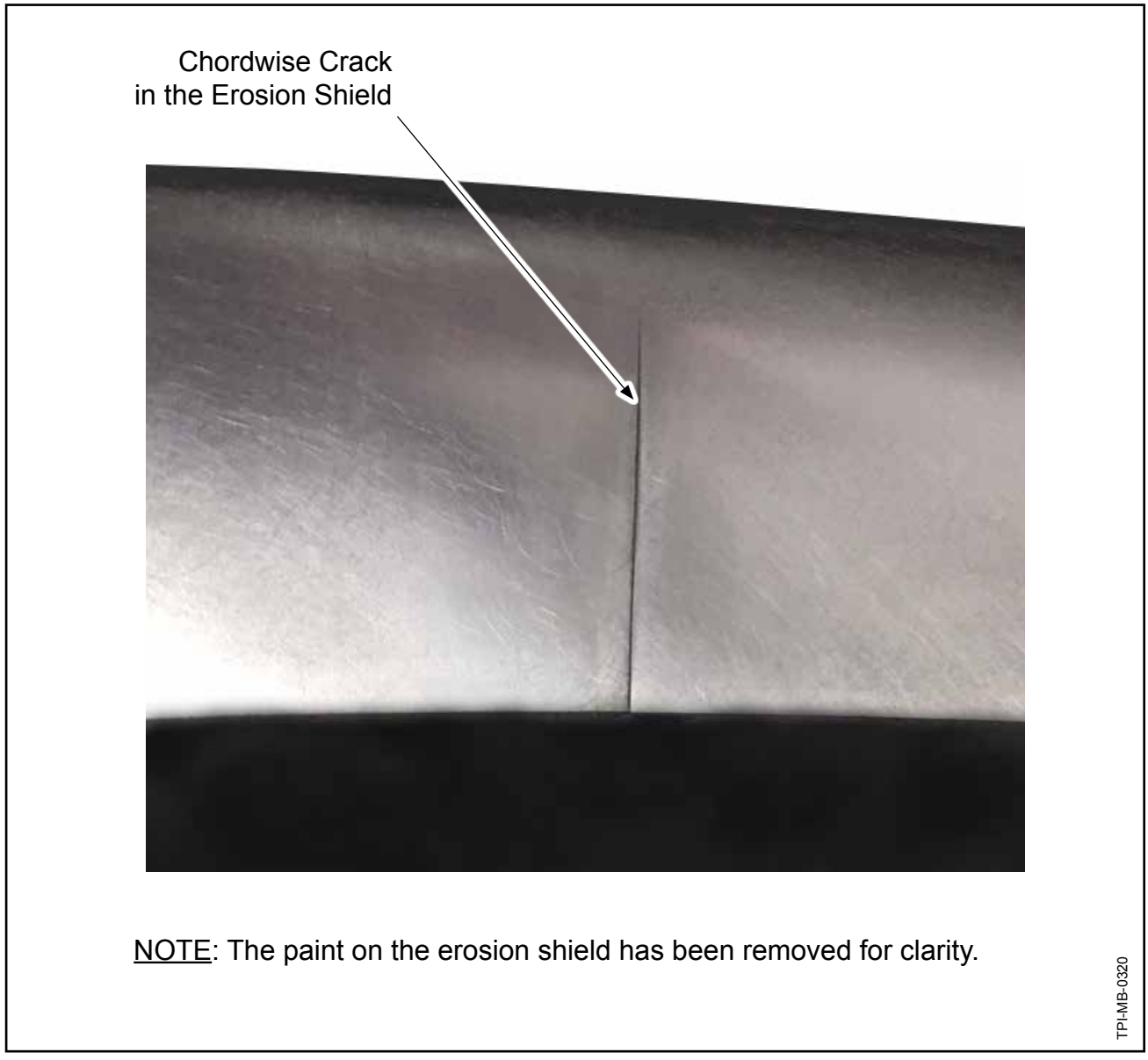
(7) Gouge or Loss of Composite Material - all areas except erosion shield - (Table 1: Damage Types 21, 22, and 23)

(a) Impact damage to the blade surface area where composite material has been removed. Refer to the example shown in Figure 13.

Gouge or Loss of Composite Material - all areas except the erosion shield
Figure 13

(8) Chordwise Crack in the Erosion Shield - (Table 1: Damage Type 5)

(a) A separation within a material, usually visible as a narrow opening at the surface that is approximately perpendicular to the leading edge of the blade. Refer to the example shown in Figure 14.



Chordwise Crack in the Erosion Shield
Figure 14

(9) Lengthwise Crack in the Erosion Shield - (Table 1: Damage Type 6)

(a) Irregularly shaped separation within a material, usually visible as a narrow opening at the surface that runs approximately parallel to the leading edge of the blade. Refer to the example shown in Figure 15.

NOTE: The paint on the erosion shield has been removed for clarity.

TPI-MB-0321

Lengthwise Crack in the Eorsion Shield
Figure 15

(10) Debond - (Table 1: Damage Type 4)

(a) Separation of two materials that were originally bonded in a separate operation.

1 A debond may not be visible. To determine if there is a debond, perform the Coin-Tap Inspection in accordance with the instructions in this Service Letter.

(11) Delamination - (Table 1: Damage Type 24, 26, and 27)

(a) Internal separation of the layers of a composite material.

1 A delamination may not be visible. To determine if there is a delamination, perform the Coin-Tap Inspection in accordance with the instructions in this Service Letter.

B. Coin-Tap Inspection

(1) Composite blades are inspected for delaminations and debonds by tapping the area with suspected damage (including the area surrounding the suspected damage) with a washer-shaped metal tapper or "coin". Refer to Figure 16.

(2) Using a washer-shaped metal tapper, approximately 2.5 inches (64 mm) OD x 1.25 inches (32 mm) ID x 0.25 inch (6.4 mm) thick, and weighing no less than 3 oz. (85.05 g), tap the area with suspected damage and also the area surrounding the suspected damage.

(a) If an audible change is apparent, sounding hollow or dead, a debond or delamination is likely.

(b) N-shank blades incorporate a separate foam trailing edge and have a different tone when coin-tapped in that area.

1 To avoid confusing sounds, coin-tap the foam trailing edge area and the transition area between the foam trailing edge and the blade separately from the blade area. Refer to Figure 16.

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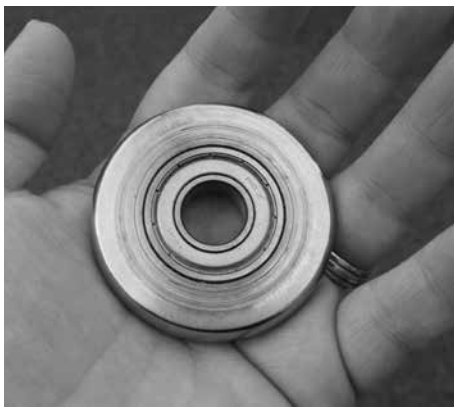
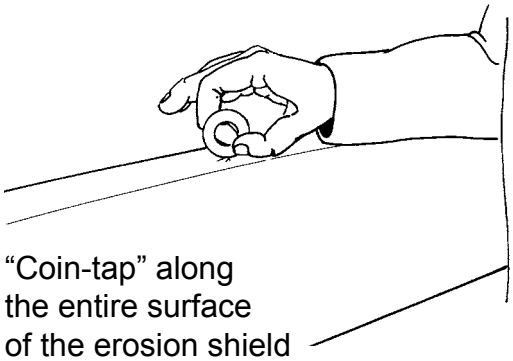
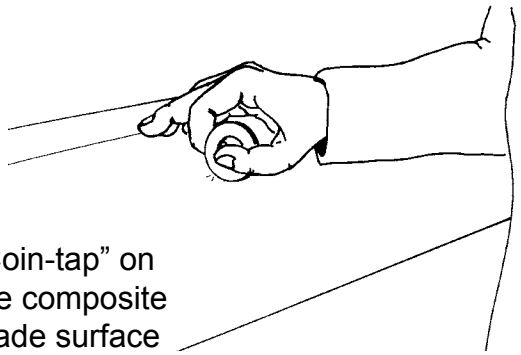
Blade - Damage Evaluation for NC10245( ) Blades Installed on (but not limited to) Pilatus PC-12 Aircraft



Example of a "Coin"



"Coin-tap" along the entire surface of the erosion shield to check for a debond



"Coin-tap" on the composite blade surface to check for a delamination

APS0325, 0319

Coin-Tap Inspection
Figure 16

(3) "Mapping" of the area to be coin-tapped is desirable to make sure that the entire surface is sufficiently inspected.

(a) Make a coin-tap inspection within an imaginary grid or matrix consisting of 2 inch (51 mm) squares on the composite blade surface.

(b) A careful coin-tapping of the erosion shield is necessary because of its size and shape.

1 Tap in a smaller grid pattern up and down the length of the erosion shield.

2 Look and feel for any slight deformation of the erosion shield that may indicate a debonded area.

3 If a deformation is found, use more care in that area when doing the coin-tap inspection.

(c) If a suspected delamination or debond is found, a localized, careful coin-tap inspection is required to define the precise area of delamination or debond.

(d) Using a pencil, outline the suspected area to determine the approximate size of the damage.

(4) Make a record of the damage and the repair in the propeller logbook.

AMI Request Form

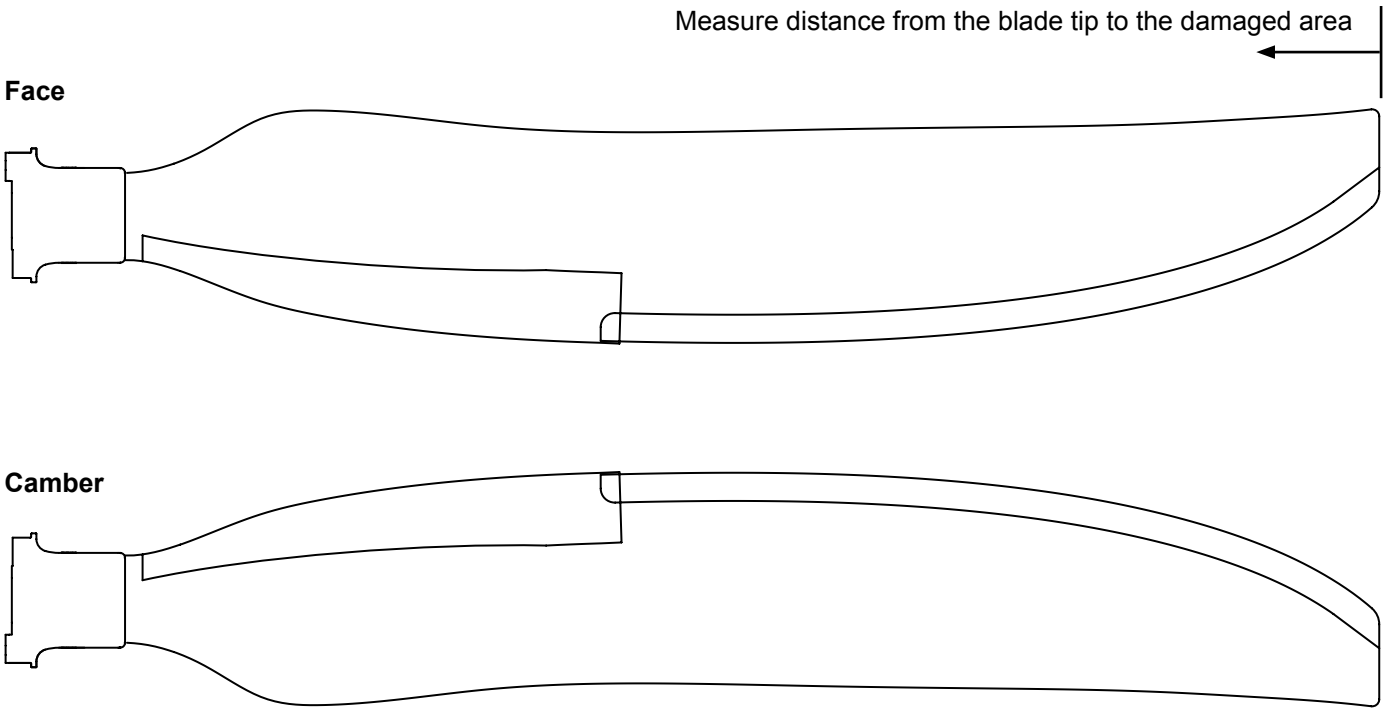
Propeller/Aircraft Information:	
Aircraft Model:	Aircraft Registration #:
Propeller Model: HC-E5A-3A	Propeller S/N:
Propeller TSN (Time Since New):	Propeller TSO (Time Since O/H):
Blade Model: NC10245( )	Blade S/N:
Blade TSN (Time Since New):	Blade TSO (Time Since O/H):
Conditional Operation/Flight Request:	
Request operation in current condition? ☐ YES ☐ NO	Flight hours requested:

Damage Type:
(Refer to the section, "Types of Damage" in this Service Letter for descriptions of each damage type)

☐ Crack ☐ Debond ☐ Gouge ☐ Delamination ☐ Split

Diagram of Blade Damage:

Sketch the damage in the approximate location on the diagram below.
Show the distance from the blade tip to the center of the damaged area.
Show the distance from the leading edge or trailing edge to the center of the damaged area.
Digital pictures of the blade damage are not required, but are helpful to determine airworthiness.
Submit digital pictures of damage with this form if available.



NOTES:

Send this completed form to Hartzell Propeller Inc. Product Support Department:
Fax - (001) 937.778.4215 or E-mail - techsupport@hartzellprop.com